SHARI HILL ESTATES (PWS 3370034)

SOURCE WATER ASSESSMENT OPERATOR REPORT

RGT 4-6-04

May 17, 2004

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for Shari Hill Estates,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, the three scores combined results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories: inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The Shari Hill Estates drinking water system (PWS 3370034) consists of one ground water well source: Well #1. Water chemistry tests are routinely conducted on the drinking water system. There has been one detection of arsenic at 0.037 milligrams per liter (mg/L), which is over the EPA maximum contaminant level (MCL). The EPA MCL for arsenic is currently 0.010 mg/l. Systems have until 2006 to meet the arsenic standard. Elevated levels of arsenic occur naturally in a large portion of SW Idaho ground water. Section Four of this report outlines options that are available and should be explored by Shari Hill Estates. From August 2002 to November 2003, nitrate levels in the well ranged from a non detect to 6.72 mg/l. All detections of nitrate have been less than the EPA MCL of 10 mg/L. However, three detections were over ½ of the MCL for nitrate. There have been no other IOC constituents detected in the well water. There have been no detections of SOC, VOC, or microbial contaminants in the well water. However, the county level herbicide and total agriculture chemical use has been rated high for the area. The delineation also passes through a priority area for nitrate and arsenic.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Shari Hill Estates, drinking water protection activities should first focus on correcting deficiencies outlined in the 2002 Sanitary Survey, including maintaining the air bleeding seal. Any spills from the potential contaminant sources listed in Table 1 should be carefully monitored, as should any future development in the delineated areas. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. Also, disinfection practices should be considered if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead.

Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A water system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the DEQ or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE SHARI HILL ESTATES

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings, used to develop this assessment, is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments for sources active prior to 1999 were completed by May of 2003. SWAs for sources activated post-1999 are being developed on a case-by-case basis. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The DEQ recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. The DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Shari Hill Estates well serves approximately 27 people through 12 connections. The well is located in Owyhee County, to the south of Marsing (Figure 1). The public drinking water system for the Shari Hill Estates is currently comprised of one well: Well #1.

Arsenic has been detected at the well at a concentration of 0.037 mg/L, which is over the EPA maximum contaminant level (MCL). The EPA MCL for arsenic is currently 0.010 mg/l, but systems have until 2006 to come into compliance. From August 2002 to November 2003, nitrate levels in the well ranged from a non detect to 6.72 mg/l. All detections of nitrate have been less than the MCL of 10 mg/L. However, three detections of nitrate were over ½ of the MCL. There have been no other IOC constituents detected in the well water. There have been no detections of SOC, VOC, or microbial contaminants.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used information compiled by BARR Engineering to perform the delineations using a combination of MODFLOW and a refined analytical element computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Boise Valley aquifer in the vicinity of the Shari Hill Estates. The computer models used site specific data, assimilated by BARR Engineering and DEQ from a variety of sources including the Shari Hill Estates well long, along with local area well logs, the Treasure Valley Hydrologic Project, and hydrogeologic reports (detailed below).

Treasure Valley Hydrologic Project Information (Petrich and Urban, 1996; Neely and Crockett, 1998; Petrich et al., 1999)

The "Treasure Valley" is a geopolitical region that includes the lower Boise River sub-basin. The lower Boise River sub-basin begins where the Boise River exits the mountains near the Lucky Peak Reservoir. From Lucky Peak Dam the lower Boise River flows about 64 (river) miles northwestward through the Treasure Valley to its confluence with the Snake River. The Treasure Valley Hydrologic Project area encompasses the lower Boise River area, and extends south to the Snake River. The southern area is included in the study area because of ground water flow from the Lower Boise River basin south toward the Snake River.

Significant amounts of desert area were converted to flood irrigated agriculture beginning in the 1860s. Irrigation led to increases in shallow ground water levels in some areas. The shallow groundwater levels provided an inexpensive and readily obtainable water supply that is used extensively throughout the valley. Much of the population growth in the Treasure Valley has been occurring in previously flood-irrigated agricultural areas, resulting in increased pumpage and a reduction in local aquifer recharge. In addition, irrigation in some areas has become more efficient, reducing the amount of irrigation-related infiltration. Decreasing aquifer recharge and increasing pumpage is thought to be contributing to decreasing ground water levels in some areas.

The Treasure Valley experiences a temperate and arid-to-semiarid climate. Average high temperatures range from about 90°F in summer to 36°F in winter; low temperatures range from about 20 °F in winter to about 56°F in summer. The average precipitation ranges from about 8 to 14 inches throughout most of the valley, most of which falls during the colder months.

Major surface water bodies include the Boise River, Lake Lowell, and Lucky Peak Reservoir. The primary source of surface water in the Treasure Valley is precipitation falling in the high elevation area in the Boise River basin upstream of Lucky Peak Dam. Much of the runoff from high elevation areas is stored in three reservoirs: Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir.

The region's croplands are irrigated primarily with surface water through an extensive network of reservoirs and canals. The first canals were constructed in the 1860's; there are now over 1,100 miles of miles of major and intermediate canals in the Treasure Valley. The primary sources of the irrigation water in the Treasure Valley include the Boise, Snake, and Payette Rivers. The majority of canals are owned and maintained by canal companies and irrigation districts.

Hydrogeology (from Petrich et al., 1999)

The lower Boise River sub-basin (Treasure Valley) is located within the northwest- trending topographic depression known as the western Snake River Plain. The western Snake River Plain is a relatively flat lowland separating Cretaceous granitic mountains of west-central Idaho from the granitic/volcanic Owyhee mountains in southwestern Idaho. The western Snake River Plain extends from about Twin Falls, Idaho northwestward to Vale, Oregon. The Snake River Plain is about 30 miles wide in the section containing the lower Boise River.

Sediments originating from the surrounding mountains began accumulating on top of thick, basal basalts. Rifting and continued subsidence maintained the lowland topography, leading to the additional accumulation of water and sediments (Othberg, 1994). Basin infilling by sediments and basalt occurred from the late Miocene through the late Pliocene (Othberg, 1994). Incision caused by flowing water in major drainages (e.g., Snake and Boise Rivers) began in the late Pliocene or early Pleistocene, although deposition of coarse sediments continued during Quaternary glaciations (Othberg, 1994).

Several Quaternary basalt flows have been described in the western Snake River Plain, and have been assigned to the upper Snake River Group (Malde, 1991; Malde and Powers, 1962). Lava flowed across portions of the ancestral Snake River Valley (Malde, 1991) in an area that is now south of the Boise River. The Snake River then changed course, incising at its present location along the southern margin of the basalt flows. More recent eruptions (from Kuna Butte and other local sources) spilled lava into the canyon south of Melba. The Snake River has since incised this basalt (Malde, 1991).

The general stratigraphy of the western Snake River Plain consists of (from top to bottom) a thick layer of sedimentary deposits underlain by a thick series of basalt flows, which in turn are underlain by older, tuffaceous sediments and basalt (Malde, 1991; Clemens, 1993). The upper thick zone of sediments (up to approximately 6,000 feet thick) distinguishes the western Snake River Plain from the eastern Snake River Plain, in which the upper section is primarily Quaternary basalt (Wood and Anderson, 1981).

The uppermost sediments and basalt belong to the Pleistocene-age Snake River Group. The Snake River Group consists of terrace sediments, Quaternary alluvium, and Pleistocene basalt flows (Wood and Anderson, 1981). Snake River Group sediments and basalts cover much of the project area (Othberg and Stanford, 1992).

The Snake River Group overlies the Idaho Group sediments. The Idaho Group sediments can be divided into two general parts (Wood and Anderson, 1981). The lower Idaho Group contains sediments described as lake and stream deposits of buff white, brown, and gray sand, silt, clay, diatomite, numerous thin beds of vitric ash, and some basaltic tuffs. The upper part of the lower Idaho Group also contains some local, thin, basalt flows. The upper Idaho Group consists of sands, claystones, and siltstones, but differs from the lower Idaho Group in that it contains a greater percentage of coarser-grained materials. The upper Idaho Group are associated with a fluvial/deltaic/lacustrine depositional environment; the lower Idaho Group sediments were deposited in more of a lacustrine/deltaic environment (Wood, 1994).

Wood (1994) identified a buried lacustrine delta within the Idaho Group sediments in the Nampa-Caldwell area. The location of the delta in the middle of the western Snake River Plain suggests that the eastern part of the Boise River basin was delta plain and flood plain at the time of deposition, while the western part was a deep lake environment. The delta probably prograded northwestward into a lake basin 830 feet deep, based upon high resolution seismic reflection data and resistivity log interpretations. The delta-plain and front sediments were shown to be mostly fine-grained, well-sorted sand with thin layers of mud (Wood, 1994). The northwest trend of the delta indicates a sediment source to the southeast, such as where the Snake River flows today (Wood, 1994).

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise (although the clay is not found in the extreme eastern portions of the Treasure Valley). The clay varies from a few feet to a few hundred feet in thickness. Although significant layers of clay are present throughout the Idaho Group sediments, individual clay units are not necessarily continuous over large areas. Also, the top of the clay can vary in elevation by up to approximately 200 feet in some locations, such as in an area west of Lake Lowell. In general, sediments above the “blue clay” are coarser-grained than the interbedded sands, silts, and clays underlying the “blue clay.”

The top of the upper Idaho Group is marked in several parts of the Treasure Valley by a widespread fluvial gravel deposit known as the Tenmile Gravels. Tenmile Gravels contain rounded granitic rocks and felsic porphyries originating from the Idaho batholith to the north and northeast. The Tenmile gravels range up to 500 feet in thickness along the Tenmile Ridge south of Boise, but are less than 50 feet thick in the Nampa-Caldwell area (Wood and Anderson, 1981).

Aquifer Systems and Hydrogeologic Characteristics

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Aquifers contained in the Snake River and Idaho Group sediments comprise shallow and regional ground water flow systems. Shallow aquifers contained in Snake River Group sediments and basalts may belong to local flow systems. Most local flow system recharge stems from irrigation infiltration and channel (e.g., streams or canals) losses. Discharge from shallow, local flow systems often is to local drains or streams. The time from recharge to discharge in shallow flow systems *(residence time*s) probably ranges from days to tens of years.

In contrast, regional ground water flow systems extend much deeper than local flow systems. The Treasure Valley regional flow system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments described by Squires et al. (1992). Some water also enters the regional flow system as underflow from the Boise Foothills in the northeastern part of the valley. The regional flow system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

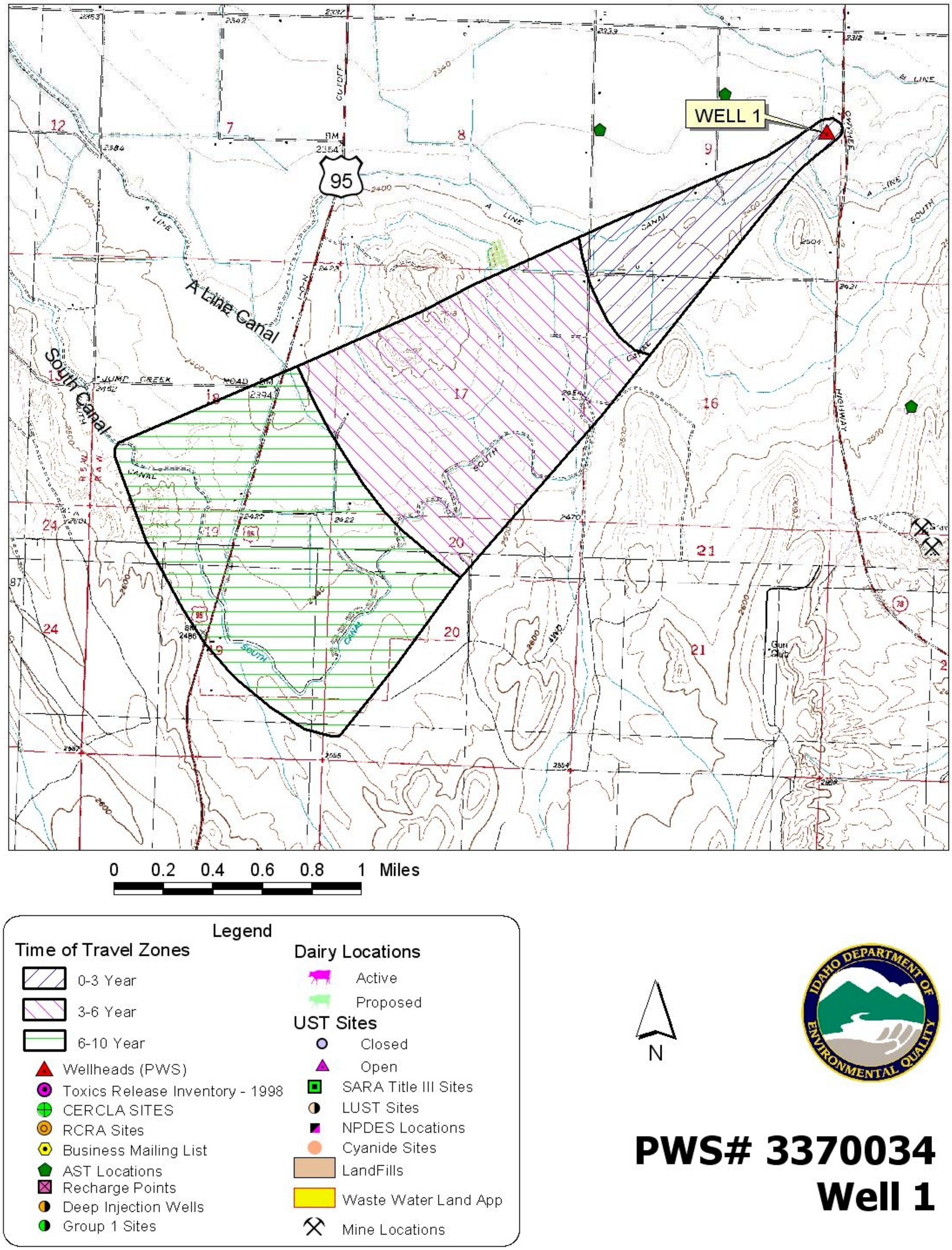
Aquifer material characteristics, material heterogeneity, and structural controls influence Treasure Valley ground water flow. Coarse-grained materials (e.g., sand and gravel) in upper zones are more capable of transmitting ground water than fine-grained sediments (e.g., silt and clay). Clay and silt in the Snake River sediments can restrict vertical and/or horizontal ground water movement. Perched aquifers are created when fine-grained lenses impede downward vertical flow. A distinctive clay layer, sometimes referred to as "blue clay," is present over large portions of the valley. The clay is absent in the easternmost portions of the lower Boise River Basin, but can reach a thickness of more than 200 feet toward the central and western portions of the basin.

Sequences of interbedded sand, silt, and clay, such as the Deer Flat Surface and the upper portion of the Glenns Ferry Formation of the upper Idaho Group in the Nampa-Caldwell area, are the major water-producing aquifers in a large part of Canyon County (Anderson and Wood, 1981). The coarse-grained sediments in this zone produce water in excess of 2,000 gallons per minute (gpm).

The Snake River was used as a constant head boundary to the northeast of the well. The no-flow boundaries used for the model for the Shari Hill Estates were marked by the BARR boundary for the calibrated hydraulic conductivity zone of 81 feet per day.

The delineated source water assessment areas for the Shari Hills Estates can best be described as an northeastward trending corridor approximately 4 miles long and 1 mile wide (Figure 2). The actual data used by DEQ in determining the source water assessment delineation areas are available upon request.

Figure 2. Shari Hill Estates Delineation Map and Potential Contaminant Source Locations



PWS# 3370034
Well 1

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and the Shari Hills Estate and from available databases.

Land use within the immediate area of the wellheads consists of low density residency and agriculture. The dominant land use outside the Shari Hills Estate area is irrigated agriculture. Highway 95, A-Line Canal, and South Canal also run through the area.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted during January of 2004. The first phase involved identifying and documenting potential contaminant sources within Shari Hill Estates Assessment Area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second or enhanced phase of the contaminant inventory involved contacting the operator to validate the sources identified in phase one and to add any additional potential sources in the area.

The DEQ computer databases revealed no potential contaminant sources within the delineation of the well. However, Highway 95, A-Line Canal, and South Canal are major sources that cross the delineation (Figure 2). If an accidental spill occurred in any of these sources, IOCs, VOCs, SOCs, or microbial contaminants could be added to the aquifer system (See Table 1). In addition, the 2002 Sanitary Survey mentioned a creek within 200 feet of the well, which is also a potential source for IOCs, VOCs, SOCs and microbial contaminants.

Table 1. Shari Hill Estates, Well #1, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
	Creek	0-3	Sanitary Survey	IOC, VOC, SOC, Microbes
	A-Line Canal	0-6	GIS Map	IOC, VOC, SOC, Microbes
	South Canal	0-10	GIS Map	IOC, VOC, SOC, Microbes
	Roads	0-10	GIS Map	IOC, VOC, SOC, Microbes
	Highway 95	6-10	GIS Map	IOC, VOC, SOC, Microbes

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination. Lower hydrologic sensitivity scores imply a system is less vulnerable to contamination.

The hydrologic sensitivity was rated moderate for the well (see Table 2). This rating is based upon moderate-to-well drained soil characteristics defined by the Natural Resource Conservation Service. According to the well log the vadose zone is comprised mainly of boulders and gravels. The first water encountered is not marked on well log, but the static water level is 28 feet below ground surface (bgs) and first groundwater in wells in close proximity to the Shari Hill Estates well range from 45 feet to 265 feet. However, there is an approximately 100 feet thick fine-grained zone above the producing zone of the well, which lowers the hydrologic sensitivity rating for the well.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. Lower system construction scores imply a system is less vulnerable to contamination. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100-feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in Sanitary Surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The Shari Hill Estates drinking water system consists of one well that extracts ground water for community uses. The well was rated as moderate susceptibility for system construction (Table 2).

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the requirements include casing thickness, well tests, and depth and formation type that the surface seal must be installed into. The annular seal of the Shari Hill Estates extends into a boulder, sand and gravel layer, which is not a low permeability unit. This does not meet Idaho Department of Water Resources *Well Construction Standards Rules* (1993). The 2002 Sanitary Survey found that the sanitary seal needed an air bleeding seal. The well is protected against flooding according to sanitary survey and is located outside the 100-year flood plain, which lowers the susceptibility rating. The static water level is 102 feet above the highest production level in the well, which also lowers the susceptibility rating of the well.

Potential Contaminant Source and Land Use

The well rated high for IOCs (e.g. arsenic, nitrate), SOCs (e.g. pesticides), VOCs (e.g. petroleum products), and microbial contaminants (e.g. bacteria) (Table 2). The creek, Highway 95, roads, A-Line Canal and South Canal all increased the rankings for each of the four contaminant categories. County level herbicide and total agricultural chemical use is high which increased the ranking for SOCs and VOCs. The majority of the land use is irrigated agriculture, which increased the ranking for IOCs. In addition, the delineation falls within priority areas for nitrate and arsenic, which also increased the IOC rating.

Final Susceptibility Rating

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well, despite the land use of the area, because a pathway for contamination already exists. This is the case for the IOC susceptibility rating due to the arsenic concentration of 0.037 mg/L, which is over the EPA MCL. In addition, having sources within 50 feet of the wellhead gives an automatic high score for the type of contaminant in question. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time-of-travel zone (Zone 1B) and a large percentage of irrigated agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, the well rated high for IOC, VOC, SOC and microbials (Table 2).

Table 2. Summary of the Shari Hill Estates Susceptibility Evaluation

Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	H	H	H	H	M	H(*)	H	H	H

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
[2]H(*) = Well rated high and automatically high due to detection of arsenic over MCL

Susceptibility Summary

In terms of total susceptibility, the well rated high for all categories. The creek, Highway 95, roads, A-Line Canal and South Canal contributed the most land use points to the susceptibility rating. In addition, the dominant land use of irrigated agriculture also contributed to the susceptibility ratings.

There has been one detection of arsenic at the 0.037 mg/L, over the EPA maximum contaminant level. The EPA MCL for arsenic is currently 0.010 mg/l, but systems have until 2006 to come into compliance. From August 2002 to November 2003, nitrate levels in the well ranged from a non detect to 6.72 mg/l. All detections of nitrate have been less than the MCL of 10 mg/L. However, three detections were over ½ of the MCL for nitrate. There have been no other IOC constituents detected in the well water. There have been no detections of SOC, VOC, or microbial contaminants. However, the delineated area of the well crosses a priority area for nitrate and arsenic and county level herbicide and total agricultural chemical use has been rated high for the area.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local source water protection area. For the Shari Hill Estates, drinking water protection activities should first focus on correcting deficiencies outlined in the 2000 Sanitary Survey, including installing an air bleeding seal. Any spills from the potential contaminant sources listed in Table 1 should be carefully monitored, as should any future development in the delineated areas. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. Also, disinfection practices should be considered if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead.

Due to the fact that the arsenic in the well is greater than the level of the revised MCL, the system may need to consider implementing engineering controls to monitor and maintain or reduce the level of this contaminant in the water system. The EPA plans to provide up to $20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the new MCL (www.epa.gov). EPA (2002) recently released an issue paper entitled *Proven Alternatives for*

Aboveground Treatment of Arsenic in Groundwater, which can be found at http://www.epa.gov/tio/tsp/download/arsenic_issue_paper.pdf.

A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near residential land uses areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA.

Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service. There are transportation corridors near the delineations; therefore the Department of Transportation should be involved in protection activities.

A water system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices).

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Boise Regional DEQ Office	(208) 373-0461
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, (mlharper@idahoruralwater.com) Idaho Rural Water Association, at (208) 343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Attachment A

Shari Hill Estates
Susceptibility Analysis
Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Public Water System Name: Shari Hill Estates
Public Water System Number: 3370034
Well Number: 1
Date: 4/1/2004
Person Conducting Assessment: Jessica Fox

Version 2.1
5/19/1999

Hydrologic Sensitivity Worksheet

			Value	Comments
(1)	Do the soils belong to drainage classes in the poorly drained through moderately well drained categories?	○ Yes ◉ No	2	
(2)	Is the vadose zone composed predominantly of gravel, fractured rock; or is unknown?	◉ Yes ○ No	1	Mainly boulders and gravels
(3)	Is the depth to first groundwater greater than 300 feet?	○ Yes ◉ No	1	First water encountered not marked on well log, but SWL is 28' and first groundwater in wells in the area range from 45' to 265".
(4)	Is an aquitard present with silt/clay or sedimentary interbeds within basalt with greater than 50 feet cumulative thickness?	◉ Yes ○ No	0	There is approximately 100' of clay before top production level

Hydrologic Sensitivity Score = 4

Final Hydrologic Sensitivity Ranking = Moderate Hydrologic Sensitivity Score (2 to 4 points)

Public Water System Name: Shari Hill Estates
Public Water System Number: 3370034
Well Number: 1
Date: 4/1/2004
Person Conducting Assessment: Jessica Fox

Version 2.1
5/19/1999

Source Construction Worksheet

			Value	Comments
(1)	Well Drill Date	Input Date: March 28, 1994		
(2)	Well Drillers Log Available?	◉ Yes ○ No		If no well log is available answers to (4) and (6) are assumed to be NO and points are added to score.
(3)	Sanitary Survey Available? If Yes, for what year?	◉ Yes ○ No; Year: 2002		If no sanitary survey is available answer to Questions (5) and (8) is assumed to be NO and points are added to score.
(4)	Are current IDWR well construction standards being met?	○ Yes ◉ No	1	The annular seal does not extend into a low permeability unit
(5)	Is the wellhead and surface seal maintained in good condition?	○ Yes ◉ No	1	There is no air bleeding seal
(6)	Do the casing and annular seal extend to a low permeability unit?	○ Yes ◉ No	2	Annular seal extends 21' into boulders, sand and gravel
(7)	Is the highest production interval of the well at least 100 feet below the static water level?	◉ Yes ○ No	0	Production interval is 102' below SWL
(8)	Is the well located outside the 100 year floodplain and is it protected from surface runoff?	◉ Yes ○ No	0	the well is protected against flooding according to sanitary survey and is located outside the 100 year flood plain

Source Construction Score = 4

Final Source Construction Ranking = Moderate Source Construction Score (2 to 4 points)

	Public Water System Name:	Shari Hill Estates				Version 2.1			
	Public Water System Number:	3370034				5/19/1999			
	Well Number:	1							
	Date:	4/1/2004							
	Person Conducting Assessment:	Jessica Fox							

Potential Contaminant Source/Land Use Worksheet

	Land Use/Zone IA					**IOC Score**	**VOC Score**	**SOC Score**	**Microbial Score**
(1)	Land Use (Pick the Predominant Land Type)	Irrigated Cropland				2	2	2	2
(2)	Is Farm Chemical Use High or Unknown? (Answer No if (1) = Urban/Commercial)	◉ Yes	○ No			**Complete Step 2a**			
2a	Indicate approriate chemical category	☐ IOCs ☑ VOCs ☑ SOCs				0	2	2	0
(3)	Are IOC, VOC, SOC, Microbial or Radionuclide contaminant sources Present in Zone IA? OR Have SOC/VOC contaminants been detected in the well? OR have IOC contaminants been detected above MCL levels in the well? If Yes, please check the appropriate chemical	◉ Yes ☑ IOCs ☐ VOCs ☐ SOCs ☐ Microbials	○ No						
			Land Use Subtotal			**2**	**4**	**4**	**2**

Potential Contaminant Source/Land Use Worksheet (continued)

Zone IB

						IOC Score	VOC Score	SOC Score	Microbial Score
(4)	Contaminant Sources Present in Zone IB?	(●) Yes	( ) No						
	Number of Sources in Zone IB in Each Category?		# IOC Sources	3		6	6	6	6
	(List sources by Category up to a Maximum of Four per Category)		# VOC Sources	3					
			# SOC Sources	3					
			# Microbial Sources	3					
(5)	Are there Sources of Class II or III Leachable Contaminants in Zone IB?	(●) Yes	( ) No			IOC Score	VOC Score	SOC Score	Microbial Score
	(List Sources up to a Maximum of Four per Category)		# IOC Sources	7		4	3	3	0
			# VOC Sources	3					
			# SOC Sources	3					
(6)	Does a Group 1 Priority Area Intercept or Group 1 Priority Site Fall Within Zone IB?	(●) Yes ☑ IOCs ☐ SOCs	( ) No ☐ VOCs ☐ Microbials			2	0	0	0
(7)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone IB.	Greater Than 50 % Irrigated Agricultural Land				4	4	4	4
			Zone IB Subtotal			**16**	**13**	**13**	**10**

Potential Contaminant Source/Land Use Worksheet (continued)

	Zone II				IOC Score	VOC Score	SOC Score	Microbial Score
(9)	Are Contaminant Sources Present in Zone II?	◉ Yes	○ No	Complete Step 9a				
9a	What types of chemicals?	☑ IOCs ☑ VOCs ☑ SOCs			2	2	2	0
(10)	Are there Sources of Class II or III Leachable Contaminants in Zone II?	◉ Yes	○ No	Complete Step 10a				
10a	What type of contaminant?	☑ IOCs ☑ VOCs ☑ SOCs			1	1	1	0
(11)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone II.	Greater Than 50 % Irrigated Agricultural Land			2	2	2	0
			Zone II Subtotal		**5**	**5**	**5**	**0**

	Zone III				IOC Score	VOC Score	SOC Score	Microbial Score
(12)	Contaminant Sources Present in Zone III?	◉ Yes	○ No	Complete Step 12a				
12a	What types of contaminant?	☑ IOCs ☑ VOCs ☑ SOCs			1	1	1	0
(13)	Are there Sources of Class II or III Leachable Contaminants in Zone III?	◉ Yes	○ No	Complete Step 13a				
13a	What types of contaminants?	☑ IOCs ☑ VOCs ☑ SOCs			1	1	1	0
(14)	Is there Irrigated Agricultural Land That Occupies > 50% of Zone III?	◉ Yes	○ No		1	1	1	0
			Zone III Subtotal		**3**	**3**	**3**	**0**

		IOC Score	VOC Score	SOC Score	Microbial Score
	Community and Non-Community, Non-Transient System Contaminant Source/Land Use Score	**26**	**25**	**25**	**12**

Public Water System Name:	Shari Hill Estates	Version 2.1
Public Water System Number:	3370034	5/19/1999
Well Number:	1	
Date:	4/1/2004	
Person Conducting Assessment:	Jessica Fox	

SWA Susceptibility Rating Sheet

		Rationale for High Susceptability in Zone IA
Zone IA Susceptability Rating **Warning**: Due to specific conditions found in Zone IA this well has been assigned a High overall susceptability for: *This rating is based on: (1)The presence of contaminant sources in Zone IA or (2)The detection of specific SOC/VOC chemicals in the well or (3)The detection of specific IOC chemicals above MCL levels in the well.* *Public Water Systems may petition IDEQ to revise susceptibility rating based on elimination of contaminant sources or other site-specific factors.*	IOC Contaminants	There has been a detection for arsenic (an IOC) over the EPA MCL

Community and Noncommunity-Nontransient Sources	**IOC Score**	**SOC Score**	**VOC Score**	**Comments**
Hydrologic Sensitivity Score =	4	4	4	
Potential Contaminant Source/Land Use Score X 0.20 =	5	5	5	
Source Construction Score =	4	4	4	
Total	**13**	**13**	**13**	

FINAL WELL RANKING
IOC Ranking is High (13 to 18 points)
SOC Ranking is High (13 to 18 points)
VOC Ranking is High (13 to 18 points)

Microbial Susceptibility Rating	**Score**	**Comments**
Hydrologic Sensitivity Score =	4	
Potential Contaminant Source/Land Use Score X 0.375 =	5	
Source Construction Score =	4	
Total	**13**	

FINAL WELL RANKING
Microbial Ranking is High (13 to 18 points)